

REMARKS

This response is intended as a complete response to the Final Office Action dated May 17, 2007. In view of the following discussion, the Applicants believe that all claims are in allowable form.

CLAIM REJECTIONS

A. 35 USC §102 Claim 19

Claim 19 is rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Application Publication No. 08-097199A, published April 12, 1996 to *Nishiyama et al.* (hereinafter *Nishiyama*). The Applicants respectfully disagree. However, to expedite prosecution, the Applicants have amended claim 19 to more clearly recite aspects of the invention.

Independent claim 19 recites limitations not taught or suggested by *Nishiyama*. "Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim" (*Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984) (citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 1 93 (Fed. Cir. 1983))). Here, a *prima facie* case of anticipation has not been established because *Nishiyama* does not identify each of the claimed elements as arranged in claim 19.

Nishiyama generally teaches a method for forming an insulation layer using a plasma enhanced chemical vapor deposition apparatus. (See, *Nishiyama*, English Machine Translation (EMT), pg. 1, ¶ [0001].) With respect to the apparatus, *Nishiyama* discloses a counterelectrode 15 that is equipped with RF generators 16 and 17 of two variable frequencies through two independent matching networks 18 and 19, respectively. (*Id.* at ¶ [0012].)

The Examiner impermissibly combines the teachings of paragraph 0019-0021 to assert a teaching of the first and the second sub-circuit for matching the impedance of a first and a second RF signal, respectively, having a variable frequency of 50 kHz to 14.2 MHz. Specifically, the Examiner cites paragraph 0019 to show that the 1st RF generator has a frequency of 13.56 MHz to 40 MHz

and paragraphs 0020-0021 to show that the 2nd RF generator has a frequency of 10 kHz to 1 MHz. However, *Nishiyama* states in paragraphs 20-21 that the frequency of the 1st RF generator is 30 MHz when the frequency of the 2nd RF generator is 10 kHz to 1MHz. *Nishiyama* fails to teach or suggest combining the different disclosed embodiments. Accordingly, *Nishiyama* does not disclose a first and a second sub-circuit, respectively, for matching the impedance of two RF signals having a variable frequency of 50 kHz to 14.2 MHz to the impedance of the plasma.

Accordingly, *Nishiyama* fails to teach or suggest a first sub-circuit for matching the impedance of a first RF signal having a variable frequency of between about 50 KHz and about 14.2 MHz generated by a first RF source to the impedance of the plasma; and a second sub-circuit for matching the impedance of a second RF signal having a variable frequency of between about 50 KHz and about 14.2 MHz generated by a second RF source to the impedance of the plasma, the second sub-circuit connected to the first sub-circuit to form a common output that is coupled to the electrode, as recited in claim 19.

Moreover, with respect to the present amendment of claim 19, *Nishiyama* further fails to teach or suggest, wherein a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second sub-circuit, as recited in claim 19, as amended.

Hence, *Nishiyama* fails to anticipate independent claim 19 because it fails to disclose each and every limitation as recited in the claim.

Thus, claim 19 is patentable over *Nishiyama*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

B. 35 USC §103 Claims 1, 3-4, 6-7, 9-10, 12-15, 17-18 and 20

Claims 1, 3-4, 6-7, 9-10, 12-15, 17-18 and 20 stand rejected under 35 USC. §103(a) as being unpatentable over *Nishiyama* in view of Japanese Patent Application Publication No 06-243992, published September 2, 1994 to *Deguchi, et al.* (hereinafter *Deguchi*). The Applicants respectfully disagree.

Independent claims 1, 9, 10, and 19 each recite limitations not taught or suggested by any permissible combination of *Nishiyama* and *Deguchi*. As shown above, claim 19 recites limitations not taught by *Nishiyama*. The Examiner admits that *Nishiyama* does not expressly teach the claimed features of the first and second matching sub-circuits with respect to claims 1, 9, 10, and 20. (See, Office Action, pg. 3) and asserts that it would have been obvious to modify *Nishiyama* with the teachings of *Deguchi* in a manner that would yield the limitations recited in the presently rejected claims. The Applicants respectfully disagree.

Deguchi teaches a plasma processing device having a matching part 14 and an RF electric power supply part 12 in which the impedance is matched by changing an oscillation frequency of output electric power on the side of the RF electric power supply part 12. *Deguchi*, however, discloses only one RF signal for one matching part and is devoid of any teaching or suggestion regarding the matching of multiple RF signals fed to a single electrode. Specifically, *Deguchi* fails to teach or suggest an apparatus for matching the impedance of a pair of RF sources coupled to a single electrode to the impedance of a plasma in a semiconductor substrate processing chamber wherein a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second sub-circuit, as recited in independent claim 1, and as similarly recited in independent claims 9, 10, and 19.

The Examiner alleges that the combined apparatus of *Nishiyama* and *Deguchi* inherently meets the limitation that a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second sub-circuit.

However, "[i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original); see also, *MPEP* §2112.

Here, the Examiner refers to paragraphs [0020]-[0021] of the present application and assumes, since the combined apparatus of *Nishiyama* and *Deguchi* allegedly appears to be similar to and may be controlled in a similar fashion as a dual frequency match circuit as described in the present application, that the allegedly inherent characteristic necessarily flows therefrom. The Applicants respectfully disagree.

The Applicants submit that configurations of dual frequency match circuits resulting from the combination of the teachings of *Nishiyama* and *Deguchi* can still result in match circuits where variation of a shunt capacitor to tune one frequency will result in a shifting of the other frequency's tune space, thereby making reliance on a theory of inherency improper. The Applicants submit herewith a Declaration of inventor Steven C. Shannon under 37 C.F.R. §1.132 in support of this assertion. For example, in paragraph 9, the Declaration states that, contrary to the Examiner's assertion, fixed series elements in the respective tuning portions of the dual frequency match circuit do not necessarily provide respective tune space independence. As such, merely providing the match circuits of *Nishiyama* with fixed series components and a variable shunt to ground will not inherently result in a dial frequency match circuit having tune space independence for the respective tuning circuits for each frequency signal.

Moreover, the Declaration further provides an example of a configuration of a dual frequency match circuit having fixed series elements and a variable shunt to ground that does not yield the limitations recited in independent claims 1, 9, 10, and 19 – that a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second sub-circuit. More specifically, the Declaration shows and describes a Smith chart depicting a modeled tune space for a first dual frequency match in accordance with embodiments of the invention (line 100) and a modeled tune space for a second dual frequency match having fixed series components and a variable shunt to ground (similar to the alleged combination asserted by the Examiner and shown by lines 102 and 104). The two lines, 102 and 104, which correspond to a tuning of one frequency by varying the shunt capacitor, clearly diverge, thereby

showing that the variation of the shunt capacitor of one tuning circuit in the second match circuit clearly alters the tune space of the second frequency. Therefore, reliance upon a theory of inherency is improper in this instance because the allegedly inherent characteristic does not necessarily flow from the combined teachings of the applied prior art.

Therefore, a *prima facie* case of obviousness has not been established because the combination of *Nishiyama* and *Deguchi* fails to teach or suggest the limitations recited in independent claims 1, 9, 10, and 19.

Thus, claims 1, 9, and 10, and all claims depending therefrom, are patentable over *Nishiyama* in view of *Deguchi*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

C. 35 USC §103 Claim 5

Claim 5 stands rejected under 35 USC §103(a) as being unpatentable over *Nishiyama* in view of *Deguchi* as applied to Claim 1 above, and further in view of US Patent No. 6,887,339, issued May 3, 2005, to *Goodman, et al.* (hereinafter *Goodman*). The Applicants respectfully disagree.

Independent claim 1, from which the above rejected claim depends, recites limitations not taught or suggested by any combination of the cited references. The patentability of claim 1 over the combination of *Nishiyama* and *Deguchi* has been discussed above.

The Examiner cites *Goodman* to show that RF sources conventionally have a 50 Ohm output impedance. *Goodman*, however, individually or in any permissible combination with *Nishiyama* and *Deguchi* does not teach or suggest a first sub-circuit for matching the impedance of a first variable frequency RF signal generated by a first RF source to the impedance of the plasma and a second sub-circuit for matching the impedance of a second variable frequency RF signal generated by a second RF source to the impedance of the plasma... wherein the first and second sub-circuits each further comprise at least one fixed set of series components and at least one variable shunt component connected to ground, and wherein a first match tune space defined by the first sub-circuit

can be varied without affecting a second match tune space defined by the second sub-circuit. Accordingly, the teachings of *Goodman* cannot be used to modify the teachings of *Nishiyama* and *Deguchi* in a manner that yields the limitations as recited in claim 1. Therefore, a *prima facie* case of obviousness has not been established because the combination of *Nishiyama*, *Deguchi*, and *Goodman* fails to teach or suggest the limitations recited in claim 1.

Thus, claim 5 is patentable over *Nishiyama* in view of *Deguchi*, and further in view of *Goodman*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claim allowed.

D. 35 USC §103 Claims 8 and 16

Claims 8 and 16 stands rejected under 35 USC §103(a) as being unpatentable over *Nishiyama* in view of *Deguchi* as applied to Claim 1 and 10 above, and further in view of US Patent No. 6,641,149, issued November 4, 2003, to *Suemasa, et al.* (hereinafter *Suemasa*). The Applicants respectfully disagree.

Independent claims 1 and 10, from which the above rejected claims respectively depend, recite limitations not taught or suggested by any combination of the cited references. The patentability of claims 1 and 10 over *Nishiyama* and *Deguchi* has been discussed above.

Suemasa teaches a plasma processing method including a process chamber having two RF power sources 122, 128, coupled through two matching devices 120, 126, to a lower electrode 106. (See, *Suemasa* Fig. 1 and accompanying text.) *Suemasa*, however, individually or in any permissible combination with *Nishiyama* and *Deguchi* fails to teach or suggest a first sub-circuit for matching the impedance of a first variable frequency RF signal generated by a first RF source to the impedance of the plasma and a second sub-circuit for matching the impedance of a second variable frequency RF signal generated by a second RF source to the impedance of the plasma... wherein the first and second sub-circuits each further comprise at least one fixed set of series components and at least one variable shunt component connected to ground,

and wherein a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second sub-circuit. Accordingly, the teachings of *Suemasa* cannot be used to modify the teachings of *Nishiyama* and *Deguchi* in a manner that yields the limitations as recited in claims 1 and 10. Therefore, a *prima facie* case of obviousness has not been established because the combination of *Nishiyama*, *Deguchi* and *Suemasa* fails to teach or suggest the limitations recited in claims 1 and 10.

Thus, claims 8 and 16 are patentable over *Nishiyama* in view of *Deguchi*, and further in view of *Suemasa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

CONCLUSION

Thus, the Applicants submit that all claims now pending are in condition for allowance. Accordingly, both further consideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Alan Taboada at (732) 935-7100 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

September 16, 2007

/ Alan Taboada /
Alan Taboada, Esq.
Reg. No. 51,359
(732) 935-7100

Moser IP Law Group
1040 Broad Street, 2nd Floor
Shrewsbury, NJ 07702